

Durham Research Online

Deposited in DRO:

11 February 2015

Version of attached file:

Accepted Version

Peer-review status of attached file:

Peer-reviewed

Citation for published item:

Egorova, Y. (2009) 'De/geneticizing caste : population genetic research in South Asia.', *Science as culture.*, 18 (4). pp. 417-438.

Further information on publisher's website:

<http://dx.doi.org/10.1080/09505430902806975>

Publisher's copyright statement:

This is an Accepted Manuscript of an article published by Taylor Francis Group in *Science as culture* on 2009 available online at: <http://www.tandfonline.com/10.1080/09505430902806975>

Additional information:

Use policy

The full-text may be used and/or reproduced, and given to third parties in any format or medium, without prior permission or charge, for personal research or study, educational, or not-for-profit purposes provided that:

- a full bibliographic reference is made to the original source
- a [link](#) is made to the metadata record in DRO
- the full-text is not changed in any way

The full-text must not be sold in any format or medium without the formal permission of the copyright holders.

Please consult the [full DRO policy](#) for further details.

De/geneticising caste: population genetic research in South Asia

Yulia Egorova

Department of Anthropology

Durham University

yulia.egorova@durham.ac.uk

Abstract

Recent years have witnessed a number of population genetics studies aiming to explore the ‘genetic profile’ of the South Asian population and to cast light on the ‘ethnic’ composition of the caste system. This paper examines four genetic studies and their mass media representations, as well as discusses interviews with leading historians and social scientists whose work focused on issues of the caste system. Similar to earlier commentators – from colonial scholars and administrators to Hindu reformers and nationalists – who provided different explanations for the origin of the caste system, recent genetic studies have offered conflicting inferences on the nature of castes and tribes of the subcontinent. These studies, the way they were received on the subcontinent, and assayed by historians of caste, tell a story about agendas of geneticization competing with forces of resistance. On the one hand, they signal a new interest in the debate about the relationship between caste and ‘ethnicity’. On the other hand, they are used selectively by different social groups to strengthen their own political agendas, are denied cognitive validity by historians of caste, and they never reached a consensus about the history of caste formation.

Introduction

In 2005 the *Dalit Voice*, a periodical reflecting the views of some of the more radical elements of the untouchable movement in India, announced that according to a recent genetic study Brahmins were not of Indian origin and hence ‘should not be allowed to occupy any constitutional position in India’ (Mahasabha 2005). What the *Dalit Voice* was referring to was a *Genome Research* paper entitled ‘Genetic evidence on the origins of Indian caste populations’, which argued in support of the theory that the caste system reflected the ancient encounters of the so-called ‘Aryans’, who came to the sub-continent from Eurasia, with the indigenous Dravidian population. The study claimed that the analysis of genetic material derived from representatives of different caste groups showed a tendency towards upper castes being more similar to Europeans, with lower castes being more similar to Asians (Bamshad et al 2001). At the same time, right-wing Hindu groups with an aim to legitimate their claims of India being the cradle of ‘Aryan civilization’ (Rajagopal 2006) made use of a

different DNA study, which argued against any major influx of people from beyond the Indo-Iranian borderland (Sahoo et al 2005). The Bamshad and Sahoo studies were just two of many more studies which have recently attempted to cast light on the nature of genetic diversity of the population of the subcontinent. Indeed, South Asia has proved to be a dynamic site for population geneticists, because it is considered to be a ‘melting pot’ comprising groups of a variety of origins.

This paper will situate these studies within the history of the colonial and post-independence conceptualisations of caste, within debates about the relationship between ‘caste’ and ‘race/ethnicity’, and within current political discussions about ‘indigenous’ identities in South Asia. It is not the objective of this paper to validate any particular account of the nature of Indian castes provided either by geneticists or other commentators. Nor will it be within its scope to attempt explicitly to open the ‘black box’ of scientific studies and critique the techniques employed in them. Instead, it will aim to explore the following three questions. What is the relationship between these studies and earlier historical conceptualisations of Indian castes? What are the possible implications that this research may have for conceptualisations of the nature of caste inequality in recent political debates in India? Finally, how were these studies received by historians of caste, who were supposed to be the primary beneficiaries of this research?

It will be argued that, on the one hand, genetic studies of the caste system signal a new interest in the relationship between caste and physicality, and call for a critical analysis of the racist assumptions that they appear to be based on. However, it will also be demonstrated that just like the diversity of explanations about the origin of the caste system provided by earlier commentators – from colonial scholars and administrators to Hindu reformers and nationalists – recent genetic studies have offered conflicting inferences on the nature of castes and tribes of the subcontinent. The models for the history of caste formation offered by geneticists were used by different social groups selectively in order to strengthen their own political agendas and to assert preferred identities. Finally, it will be shown that historians of the caste system are resisting the ‘geneticization’ of their discipline and insist on the primacy of historical and socio-cultural analysis in the study of caste. Therefore it may be suggested that population genetic research of the caste system and public responses to it provide examples of agendas of geneticization competing with forces of resistance.

Genetics, race and ethnicity

The social implications of the growing field of population genetics - connecting what could be broadly described as ethnic belonging to some biological characteristics - have become an important subject for research in social theory, cultural studies, anthropology, and the humanities disciplines. Some scholars have suggested that the received notion, that race and ethnicity are socio-cultural categories with very limited, if any at all, biological basis, is now under threat from research which attempts to correlate markers of genetic ancestry with groups classified by race and ethnicity (Abu El-Haj 2007, Hartigan 2008, Smart et al. 2008: 407). Indeed, population based DNA tests have recently been used in a wide range of studies from those exploring differences to drug response between populations (Fausto-Sterling 2004, Kahn 2004), to research aimed at helping historians in deciphering the history of groups with 'mysterious origins' (Brodwin 2002, Davis 2004, Elliott 2003, Johnston 2003, Parfitt and Egorova 2006). Some scholars are concerned that in light of these studies, differences between populations are increasingly explained in biological rather than sociocultural or political terms (Palmie 2007, Reardon 2005, Skinner 2006), or as Troy Duster (2005) has put it, population genetics has led to a 'biological reinscription of race'. At the same time, Nikolas Rose (2007: 167) hesitates to conclude that we are witnessing the rise of new genetic determinism, suggesting that current debates over race and genomics should be located within the biopolitics of the twenty-first century that 'does not seek to legitimate inequality but to intervene upon its consequences'. It has also been argued that this new genetic 'evidence' pertaining to matters of ethnicity has hardly superseded other notions of belonging (Prainsack and Hashiloni-Dolev forthcoming).

On a more general level the analysis of the impact of genetics on culture and society has led many social scientists to critique a set of phenomena, which has been described as geneticization or the new genetic essentialism. The former term was coined by Abby Lippman (1991: 19), who described it as 'an ongoing process by which differences between individuals are reduced to their DNA codes, with most disorders, behaviors and physiological variations defined, at least in part, as genetic in origin'. The expression 'new genetic essentialism' was suggested by Sarah Franklin (1993: 34) to address critically 'scientific discourse and a corresponding technology, with the potential to establish social categories based on an essential truth about the body'. Subsequently, the significance of genetic essentialism as a modern cultural concept was further examined by Nelkin and Lindee (1995).¹ In the last decade a number of commentators have explored the way categories such as race and ethnicity appear to have been 'geneticized' in biological and

biomedical research, leading to the emergence of what Bob Simpson (2000) has described as ‘imagined genetic communities’.

Large-scale studies in population genetics that have been done on a global scale include the Human Genome Diversity Project (HGDP), initiated by Luigi Luca Cavalli-Sforza in 1991, and the HapMap Project, launched in 2002 by the National Human Genome Research Institute. The HGDP was supposed to collect and preserve DNA from 500 ‘geographically isolated’ populations around the globe to be used for research on the history of human migrations and medical studies. The project initially received good publicity (Kahn 1994), but soon ran into trouble, as its initiators were accused of exploitation and even racism (Haraway 1997; M’charek 2005; Marks 2003; Reardon 2005). The aim of the HapMap project is to describe common genetic variants that occur in human beings, to identify where they occur in human DNA, and to decide how they are distributed among populations of different parts of the world. The data is then supposed to be used by researchers to link genetic variants to risk of specific diseases (HapMap 2007). It appears that scientists involved in this project have demonstrated considerable cultural sensitivity. However, the fact that the collected samples could be used to study migration patterns may still potentially prove harmful for participating communities (Davis 2004).

It has been argued by commentators in the social sciences and humanities that this type of research in population genetics has been permeated by ‘racialist’ thinking.² Indeed, some scientists have suggested that race is a useful operational category in genetic research and is of medical relevance, while the evolutionary biologist Armand Leroi (2005, p.A23) went as far as to declare that ‘races clearly exist’ and that ‘the consensus about social constructs is unravelling’.³ The way the categories of race and ethnicity are institutionalised and naturalised in population genetics has been discussed in a number of ethnographic studies of scientific practice (Reardon 2005, M’charek 2005, Fullwiley 2007a, 2007b). Duana Fullwiley (2007a), for instance, has demonstrated in her recent analysis of two laboratories of pharmacogenetics that even though researchers themselves may struggle to define race and even have negative personal experiences of having to ‘fit’ their own identity into the pre-determined categories of the US ‘race and ethnicity’ questionnaires, they still comply with the established practice of defining and comparing US groups in their work. Genetic research performed in the name of improvement in health care provision for ‘minority communities’ has raised a number of questions about the validity of these types of DNA studies. It has been suggested that their potential benefits would not outweigh dangers of stigmatization

associated with ‘ethnicization’ of diseases, which may lead to discrimination against individuals and whole groups (Nelkin 2002, Wailoo and Pemberton 2006).

In this paper my concern is primarily with genetic work aimed at reconstructing the history of human migrations. This type of science is oftentimes described as ‘genetic carbon dating’, as it is supposed to facilitate historical research which otherwise would allegedly lack adequate tools for deciphering human past. As geneticists Mary-Claire King and Arno Motulsky put it: ‘the DNA of modern humans contains a record of the travels and encounters of our ancestors’ and furthermore that:

The genotypes of people living today are the result of ancient human migrations, selection by climate and infection for genetic alleles that conferred a survival advantage, and mating patterns determined by cultural norms. By sampling genotypes from people across the globe, geneticists have reconstructed the major features of our history: our ancient African origin, migrations out of Africa, movements and settlements throughout Eurasia and Oceania, and peopling of the Americas’ (quoted in Davis 2004, 41)

To name just some such studies which specifically aimed to shed light on the processes of the formation of particular communities and thus to contribute to various historical debates one could refer to research on the ancestry of African American and Native American groups and on different Jewish communities around the world (for an overview see Egorova 2007).

One of the projects on African American ancestry was launched by Rick Kittles then based at Howard University (Sabeti 2002). The project was supposed to help African Americans to trace their ancestry to a particular region in Africa. Kittles, who belongs to this community himself, argued that it could help African Americans to find out where exactly their ancestors were from, which for some of them was a question of great importance. In addition, it was argued that such tests might turn out to be a very useful historical tool, as research on African American roots was often limited due to lack of documentation. However, Kittles admitted that in some cases these tests could have a disruptive potential if their results contradicted family lore (Sabeti 2002). Other commentators have observed that this type of research has a danger of dividing African Americans and distracting them from campaigning to improve the social and economic conditions of their community (Dula et al. 2003).

Similarly, there have been a substantial number of genetic studies addressing the origin of various Jewish groups. Perhaps the most widely publicised of these were the various studies carried out on the *Cohanim* (Jewish priests) and on the origins of the Lemba Judaising group of southern Africa (Spurdle and Jenkins 1996, Skorecki 1997, Thomas et al. 1998, Thomas et al. 2000). The latter represent an example of a group whose communal narrative has been strengthened by genetic findings.⁴

In other cases traditional creation stories have been threatened by genetic research and could even have negative practical outcomes. For instance, as Vine Deloria (1995, 82) observes, studies on Native American communities supporting the dominant story of the migration of their ancestors from the Bering Strait, promote the idea that Native Americans were not the original inhabitants of North America but ‘late comers who had barely unpacked before Columbus came knocking at the door’. Problematically, the more Native Americans are seen as ‘recent immigrants’ the weaker their claims to land and sovereignty (Davis 2004: 42). It has been pointed out that potential risks and benefits of this type of research go far beyond the individuals who actually agreed to take part in it and pertain to the group as a whole, which means a necessity for developing procedures for obtaining collective informed consent (Reardon 2005, Widdows 2007). However, the problem of seeking communal consent is complicated by the fact that the groups whose interests are concerned in these studies may be very diverse. As Davis (2004, 41) has put it, ‘a creation story that is a source of power for one subgroup may serve to marginalize another subgroup’.⁵

At the same time, it has also been noted that so far this type of genetic research does not appear to have had significant political consequences, nor does it always lead to radical changes in communal identities that would completely supersede prior conceptualisations of selfhood and belonging. When reflecting on genetic research, which was supposed to cast light on the way Jewish groups from different parts of the world relate to each other, some critics have observed that such research has not been able to bring the dispute about the origin of the Jewish people to a close, nor did it have any affect on Israeli policies (Prainsack and Hashiloni-Dolev forthcoming). To give another example related to genetic research on the Jewish communities, the Bene Israel of India had tests conducted among them which determined the presence in the community of the Cohen Modal Haplotype. This marker had been previously found in a significant proportion of Jewish priests. This led some Bene-Israel to argue that their whole community was of priestly origin, and that they were purer than Jews from other communities who used to refuse to recognise them as Jewish (Parfitt and Egorova 2006, 111-120). Alondra Nelson (2008), in her study of the outcomes of genetic

ancestry testing offered to African American and black British customers, has demonstrated that the consumers of these tests tended to interpret these results in the context of their own 'genealogical aspirations', rather than just accept them as the main marker of their identity.⁶ This position which demonstrates some degree of scepticism about the magnitude of the 'geneticization thesis' is reflected also in Nikolas Rose's (2007, 113) suggestion that 'ideas about biological, biomedical, and genetic identity will certainly infuse, interact, combine and contest with other identity claims', but they can hardly be expected ever to supplant them.

Caste, history and race

It is against the backdrop of these discussions about the scale of the 'molecularization' (Abu El-Haj 2007, Fullwiley 2007a) of categories of belonging that I would like to consider genetic research on South Asian populations and particularly the issue of caste in India.

The caste system of India is a hierarchical structure divided into a number of endogamous groups each pursuing one traditional occupation. Most mainstream historical and social anthropological accounts of the caste system suggest that castes may be seen as divided into four varnas (classes): Brahmans, Kshatriyas, Vaishyas and Shudras. Beyond the caste system there is a group of so-called 'untouchables', who are considered to be ritually polluting and whose occupations are limited to traditionally 'unclean' jobs. Discrimination against the untouchables has always been a characteristic feature of Indian social life. Although the constitution of independent India outlawed the practice of untouchability, it has survived together with the caste system itself. This has maintained a confrontation between upper castes and the untouchables some of whom have adopted the name 'Dalit' (oppressed) (Zelliot 1996).

Until the middle of the twentieth century the prevalent historical narrative discussing the origins of Indian castes, as well as of early Indian religious cultures, suggested that the system of the four classes reflected the ancient encounters of the so called 'Aryans' - who came to the sub-continent from beyond the Indo-Iranian borderlands - with the indigenous Dravidian population. According to this account, which originates in 19th-century Western Indology, the Aryans were of the same stock as those groups who went west into Europe. They spoke an Indo-European language - which developed into Sanskrit, the sacred language of Hinduism - and their traditions lay the foundation for Hindu culture. This narrative also states that the Aryans formed higher castes and the natives comprised the lower

ones, including the untouchables. Later the theory of the Aryan invasion or migration was challenged by archaeologists who emphasized South Asian insularity and made an argument for greater continuity between early traditions of the sub-continent. Today many mainstream historians argue that there is little archaeological evidence of a large-scale Aryan invasion, which would have displaced the indigenous cultures. There is yet linguistic evidence that the Indo-Aryan language was brought to South Asia from beyond the Indo-Iranian borderlands through a series of possibly small-scale migrations. It is emphasized, however, that though these people belonged to one language group they could incorporate a variety of ethnic communities and that there is not enough evidence in support of a narrative about Aryan migrants descending onto the subcontinent and forming the upper strata of ancient South Asian societies (Sharma 1999; Thapar 2002; Trautmann 1997).

Debates about the origin of the caste system and the relationship between caste and race have permeated colonial discourses about Indian society, Hindu reform ideologies, Indian nationalist thought, and post-independence Indian politics. Susan Bailey (1995) has demonstrated that colonial thinking about the origin of the caste system was multi-faceted, and oscillating between ideologies which tended to 'racialise' caste and those that saw it as a social system which had very little, if anything at all, to do with differences in physicality. Thus some scholar-administrators, such as Herbert H. Risley and W.W. Hunter, saw castes as racially defined and argued that the caste hierarchy reflected differences between groups with supposedly superior and inferior 'racial' profiles. Others, such as Denzil Ibbetson, argued that the standing of different castes in a particular locality was governed by purely political considerations (Bailey 1995).

European notions of race appear in the ideologies of Hindu nationalists of the later British period, who re-conceptualised these ideas to fit their own political agendas. Just like colonial constructions of the origin of Indian populations, Hindu reform and nationalist views on the subject were far from monolithic. Orientalist reconstructions of the Indian past no doubt influenced Swami Dayananda Saraswati - the leader of the Hindu revivalist movement the Arya Samaj - who sought to 'purify' Hinduism and return it to its Aryan Vedic glory. It has been suggested that the Arya Samaj was probably the first movement on the subcontinent to define nationalism in terms of ethnicity (Jaffrelot 1996). In his book *Satyartha Prakash* Dayananda Saraswati describes Aryans as select people to whom the Vedas were revealed by God in Sanskrit, 'the mother of all languages'. Aryans were supposed to have descended at the beginning of time from Tibet and to have settled in Aryavarta, located in the territory of the Punjab, Doab and Ganges basin, which is considered the cradle of Vedic tradition,. From

Aryavatra they would have dominated the whole world until the epic war of the Mahabharata broke out, which marked the beginning of the decline of their civilisation. The idea of Hindus being the descendants of Aryans, who came to dominate the world from their homeland on the subcontinent, was developed at the beginning of the twentieth century by another member of the Arya Samaj, Har Bilas Sarda, who rejected the Eurasian theory of Aryan descent and argued that, on the contrary, the Aryan race spread from Aryavarta to other parts of the world (Jaffrelot 1996). At the same time, other nationalist thinkers who had leanings towards Hindu ideologies, such as Bal Gangadhar Tilak, supported the idea of the ‘foreign’ origin of the Aryan forefathers of the Hindu civilization, and used it to justify the position and privileges of higher castes (Dirks 1997, 274).

Constructions of the relationship between Hinduism and race reappeared in the 1920s – 1940s in the writing and speeches of the leaders of the Hindu Mahasabha, a Hindu communalist organisation whose adherents advocated the idea of India being the land of the Hindus alone. One of its chief ideologues, Vinayak Damodar Savarkar, propagated the notion that Hindus represented a race and were indigenous to the subcontinent, but this race included the descendants of both Aryans and non-Aryans and comprised all social groups from the Brahmans to the untouchables. The aim of this rhetoric was to unite Hindus against religious minorities, first and foremost against Muslims and Christians, who were perceived as the most immediate and threatening ‘others’. However, even they could be readmitted to the Hindu ‘family’ provided that they embraced ‘Hindu civilisation’. Interestingly, even those Indian Muslims who asserted their ‘non-Aryan’ origins were welcome into the Hindu fold if they adopted some elements of Hindu belief and practice. As Christophe Jaffrelot (1996) has suggested, this ideology appeared to be much more useful for the purpose of uniting the ‘Hindu nation’ than the Aryan theory.

In independent India caste forcefully reappeared in its ethnicised incarnation in the Hindu communalist and Dalit politics. The ethnicization of Hindu communalism found particularly vivid public expression in the 1990 Babri Masjid controversy when the then President of the Hindu nationalist Bharatiya Janata Party (BJP), L.K. Advani, began a *rath yatra* (‘pilgrimage on a chariot’) to visit sites where Hindu temples allegedly had been destroyed by Muslim invaders. The yatra, which was very controversial and resulted in the escalation of communal violence, was supposed to unite Hindus of different caste groups.

In this context the theory of the Aryan migration also became a focus of vigorous political debate about the origin of the Hindu culture. When the BJP was in power from 1998 to 2004 its officials actively sought to revise textbooks on Indian history. One of the imposed

changes was the idea that the ‘Aryans’ originated on the sub-continent, which was construed as the cradle of civilisation. This trend met a strong resistance from the leading Indian historians and other left-wing academics who fought the revision of textbooks (Roy et al 2005).

At the same time, concepts of race powerfully emerged in campaigns of the Dalit movement. Some of its ideologues attempted to consolidate Dalit identities around the notion of their cultural and ethnic difference from caste Hindus based on the Aryan theory, and solidarity with communities of African descent in the West (for a detailed discussion see Prashad 2000, Reddy 2005). Quite apart from that, leaders of the Dalit movement tried to draw the attention of the international community to the conditions of the untouchables by comparing caste discrimination to racism. This question became a topic for controversy at the World Conference against Racism, Racial Discrimination, Xenophobia and Related Intolerance, which was held in 2001 in Durban. The Dalits argued that caste discrimination should be considered racism, while the Indian government insisted on it being unconnected to race and succeeded in excluding any discussion of caste at the conference (Sabir 2003).

Genetic studies on caste

The past two decades have witnessed a number of studies aiming to cast light on the origin of genetic diversity of South Asian populations. The main question that they have attempted to answer has been whether this differentiation was long-standing or was due to relatively recent migrations from outside of the subcontinent. Most of this research also had implications for the debate about the origin of the caste system. Here, by way of providing examples of this research, I will summarize some major studies that have been conducted recently and that represent diverse and sometimes dramatically conflicting positions on the genetic history of South Asian populations.

One of the first studies that appears to have attracted considerable media attention so far is that by Bamshad et al (2001). Their project sought to test the hypothesis about West Eurasians having formed the upper castes on the subcontinent. For this purpose geneticists took mitochondrial DNA, Y-chromosome variation, and 40 independent, biparentally inherited autosomal loci of Indian males from eight groups (described in the study as castes) of different rank from Andhra Pradesh. These were compared to DNA of communities from different parts of India and of the world. The tested groups included Brahmans, Kshatriyas, and Vaishyas (all three of whom were designated in the paper as ‘upper castes’); Kapu, and

Yadava ('middle castes'); and Relli, Mala and Madiga (lower castes). The findings of the study indicated that for maternally inherited mtDNA each caste was similar to Asians, however 20-30% of mtDNA haplotypes belonged to West Eurasian haplogroups. The frequency of these haplotypes was proportionate to caste rank with the highest frequency of West Eurasian haplotypes being found in the upper castes. Each caste was found more similar to Europeans than to Asians for paternally inherited Y-chromosome variation, and the affinity to Europeans was found proportionate to caste rank, with the upper castes being more similar to Europeans, particularly to East Europeans. Analysis of the biparentally inherited autosomal loci also demonstrated that the upper castes had a higher affinity to Europeans than to Asians and the upper castes were more similar to Europeans than were the lower castes. Hence the paper concluded that the analysed datasets 'show a trend toward upper castes being more similar to Europeans, whereas lower castes are more similar to Asians' (Bamshad et al. 2001, p.994).

A later study by Kivisild et al. (2003) appears to have started with a different approach. This project set out to discern the magnitude of the genetic contribution of recent migrations to the subcontinent and to determine whether the linguistic relatedness of Indo-European speakers in South Asia is reflected genetically. To do so they collected DNA material from two tribal groups in southern India who were supposed to be representative of populations preceding Aryan Indo-European language speaking groups. Subsequently, they analysed it for variation in mtDNA, Y-chromosome, and one autosomal locus, comparing it to genetic data from six caste groups obtained from different parts of India, as well as from various populations from Central and West Asia. The results taken from all three types of analysis suggested that both Indian caste and tribal populations derived from the same genetic heritage of southern and western Asians of the Pleistocene period (which finished around 10,000 BCE) and have received limited gene flow from external sources since then.

Another genetic study which came out a year later explicitly challenged Kivisild et al. This research (Cordaux et al 2004) built upon an observation that the conclusion made in Kivisild's paper, as well as in a number of other studies, was contrary to linguistic and archaeological data, which, according to the authors, supported the idea that most caste Hindus (as opposed to tribal communities) were the descendants of Indo-European-speaking migrants who had come from Central Asia around 3500 years ago. In order to cast light on the issue, Cordaux et al. collected a dataset of Y-chromosomes from 15 tribal communities and 12 castes. The study found that caste and tribe groups differed significantly in terms of their haplogroup frequency distribution. It was argued that caste groups were homogenous for

Y-chromosome variation and more closely related to each other and Central Asian groups than to Indian tribal or any other Eurasian groups. Hence the study claimed to have determined that paternal lineages of Indian caste groups were mainly derived from Indo-European speakers who migrated to the subcontinent around 3500 years ago. Conversely paternal lineages of tribal groups were predominantly descended from 'the original Indian gene pool' (Cordaux et al. 2004, p. 231).

This dramatic difference in conclusions arrived at by Kivisild and Cordaux was addressed by Sengupta et al. (2006). In this case researchers appear to have expanded the dataset yet again and collected Y-chromosome genetic material from 17 tribal populations and 18 castes. Researchers concluded that their data did not support models that invoked a significant recent genetic input from Central Asia to explain genetic variation on the subcontinent, coming full circle and supporting Kivisild et al. A similar conclusion was arrived at by Sahoo et al (2005) whose study analysed Y-chromosome data from 32 tribal and 45 caste communities from four major linguistic groups. According to the paper published on the basis of the project, the collected data 'consistently suggest a largely South Asian origin for Indian caste communities and therefore argue against any major influx, from regions north and west of India, of people associated either with the development of agriculture or the spread of the Indo-Aryan language family' (Sahoo et al 2005, p. 843).

Castes, genes and politics

It appears that scientific research on the origins of genetic diversity in South Asian populations is permeated with internal debates revolving around issues of sampling and classification of populations - topics that could become the subject of a separate paper. At the same time, just like these previous debates about caste and ethnicity, these studies are very likely to acquire political meaning. Thus Bamshad et al.'s study, which involved samples from a very limited number of groups from one particular region in India, was represented in the mass media as pertaining to the entire caste system. Most of the media and internet reports failed to mention which groups exactly were tested and announced that the study cast light on the origin of the caste system in India as a whole (Pravidhik Jagat 2004). The mass media could not entirely be blamed for making such an extrapolation. Throughout the paper the authors claim that they did indeed set out to test the 'Eurasian' hypothesis of the emergence of the whole of the caste system. Though they admit that 'comparable studies in caste populations from other regions of India must be completed to test the generality of these

results', they conclude in the end that 'because of the ubiquity of the caste system in India's history, it is reasonable to predict similar patterns in caste populations living in other areas' (Bamshad et al. 2001, 8).

This study and those that stress genetic similarities between different caste groups have already become indexed in political discussions of caste inequality. As was mentioned above, leaders of the Dalit movement, sceptical about the possibility of obtaining help from the Indian government, have attempted to attract the attention of the international community by presenting caste discrimination as a form of racism. Bamshad's study has been referenced by them as 'scientific proof' of this claim, as well as of the idea (which has a long history in the Dalit discourse) that upper caste Hindus are 'foreigners' and 'newcomers' on the subcontinent (Mahasabha 2005).

Similarly, Sahoo et al's study has been referred to in the context of the attempts made by the Hindu right to build up a case for the 'indigenusness' of the Hindu tradition. Hindutva ideologues were keen to use the study in support of their claim of the South Asian origin of the Aryan culture (Rajagopal 2006) despite the fact that the study clearly did not aim to make any inferences about where the cradle of the Indo-European civilisation was. In fact, the geneticists who participated in this study appear to be quite happy with the idea that in ancient times populations of the subcontinent may have experienced significant linguistic and other cultural influences from the 'West'. They have emphasized that their study's main claim is that cultural borrowings did not go hand in hand with genetic influxes. As Vijendra Kashyap, one of the lead scientists of the study, observed in an interview to *National Geographic News*, 'although few of the earlier studies have shown that language is a good predictor of genetic affinity and that Y chromosome is more strongly correlated with linguistic boundaries, it is not always so' (Handwerk 2006, online resource). The Hindu right eagerly used this genetic research, making a case against major influxes of 'genes' from outside of the subcontinent, to 'prove' a century old idea that the mythical Aryavarta was in ancient India. The argument, of course, is based on the assumption that migrations of cultures have to be accompanied by migrations of genes. Hindutva warriors reason that if the first speakers of Indo-European languages on the subcontinent were indigenous, then these languages originated on the subcontinent. Similarly, some participants in the Dalit movement appear to believe that studies supporting the theory of Aryan migration could add extra weight to their claims of indigeneity. Both sides seem to be attributing to genetics supreme cognitive authority, but at the same time they use genetic research to reinforce time-old claims on autochthony and the right to social and cultural superiority.

Genetic carbon dating?

As mentioned above, genetic research aimed at reconstructing the history of human migrations is often labelled both by scientists and mass media commentators as ‘genetic carbon dating’ (Parfitt and Egorova 2006). This is a rather laden description implying that it is a neutral scientific procedure to be used in reconstructing history, a helping hand lent to historians whose conventional tools, such as archives and artefacts, are not quite adequate enough to answer their own research questions. As the cover text on the book by Cavalli-Sforza *Genes, Peoples and Languages* asserts,

Historians relying on written records can tell us nothing about the 99.9 per cent of human evolution which preceded the invention of writing. It is the study of genetic variation, backed up by language and archaeology, which provides concrete evidence about the spread of cultural innovation, the movements of peoples ... the precise links between races’ (quoted in Bivins 2008, 16).

I was initially trained as a historian of India and it was intriguing for me to discern what responses these studies have elicited among my colleagues who specialise in the history and social anthropology of the caste system. For this purpose thirteen open ended semi-structured in-depth interviews were conducted in India, North America, and Russia with leading historians and social scientists whose work has focused on issues related to the caste system.⁷ In addition, I have also had numerous informal discussions on the issue with my colleagues from the fields of history and social studies of South Asia.

All my interviewees were aware of at least some genetic studies conducted on Indian populations. About two thirds of them felt very strongly that geneticists should not interfere in historical debates at all because they were bound to be asking the wrong kinds of questions, as the genetic profile of castes was of no historical significance. As one of them put it:

Studying the genetic composition of different castes is not going to be any more helpful for the understanding of the caste system, than studying the chemical composition of the paper that Shakespeare’s sonnets were written on for the understanding of their meaning.

On the whole they could not see historians using it as a methodological tool for their research in the foreseeable future. One leading historian based in India attempted to dissociate completely both himself and his discipline from genetics:

I don't think that genetic research is going to be of any help to me in ancient Indian history. Maybe other historians would be able to make use of genetics, but I can't think of any such historians... certainly in the context of India I don't think anyone has used genetics.

Others (the remaining one third of respondents) were upon reflection happy to engage with genetic studies on caste provided these studies were conducted in consultation with historians and social scientists, particularly at the stage of formulating research questions and determining sampling strategies. As one of the interviewees who worked in the field of ancient Indian history argued:

...it is historians that should be initiating this kind of study by formulating questions themselves and then directing geneticists by telling them what exactly it was that they wanted to be checked with the help of DNA tests, rather than leaving it to geneticists to be setting up their aims on the basis of their 'general knowledge' of history.

This respondent also wished it was possible to organise forums for geneticists and historians to meet and discuss the possibility of using genetics in historical research in South Asia. Another scholar, a historian of modern India, has suggested that it would be beneficial both for historians of India and geneticists working with Indian populations to acquire expertise themselves in each others' fields. This interviewee doubted that genetics was going to become a major tool of historical research any time soon, but thought historians should 'watch this space'. One sociologist, also based in India, whose work is devoted to *adivasi* (tribal Indian) identity and politics, said she had been following the work of Partha Majumdar, a geneticist from the Indian Statistical Institute in Kolkata,⁸ whose research appears to demonstrate engagement with social accounts of the history of caste. Nevertheless, even in this group of respondents, who seemed to be more open to exploring the possibility of using genetic research in their work, all respondents stressed the primacy of historical and cultural analysis in the study of caste.

Quite apart from that, irrespective of whether my respondents could see themselves referencing genetic research or not, they all stressed that this type of study was very controversial by virtue of the fact that such studies could have negative social and political implications. Practically everybody observed that such studies unnecessarily naturalise castes and are likely to weaken claims of origin of at least some of the groups concerned. In this respect several respondents based in India called on the example of the tragic controversy around the Babri Masjid when some archaeologists were volunteering to 'prove' that the mosque was or was not built on the site of the temple that allegedly commemorated the birthplace of Rama.⁹ According to them, even if it were possible to establish what was on this site historically, this information would be completely irrelevant for the discussion of who should worship at this site now and any conclusion to such a study could be used to disempower one or another group concerned. Every single interviewee noted that though the scientists who conducted the study most probably did not have any prejudices themselves and participated in their research out of 'pure academic interest', this 're-biologization' of caste represented a throw back to colonial discussions of the relationship between caste and ethnicity.

The interviewees were specifically asked to read and comment on Bamshad's study, which proved to have been most widely publicised. Almost every one of them observed that they could not understand the article completely, and that generally historians and social scientists could hardly be expected to know enough genetics to be able to 'check upon' this kind of research unless the entire system of academic education was restructured. One person said that it was a classic example of C.P. Snow's 'two cultures divide' (Snow 1979). Nevertheless, they were all able to make constructive criticisms about the way geneticists formulated their questions and selected their target population. One historian argued that he was happy to believe that Bamshad's paper was probably 'scientifically correct within the discipline of genetics', but on the whole it was a failure because the researchers were not up to date with current historical research on caste and did not define their categories properly. When assessing the value of Bamshad's study for historical research all respondents noted that the literature that the authors were referring to in the paper was not up-to-date, as the authors seemed to be completely oblivious of any recent archaeological, philological, historical, or social anthropological studies done on caste. Hence the geneticists' descriptions of varnas and castes had more to do with popular perceptions of these categories than with the current research carried out by social scientists and historians.

One historian observed that ‘they may think that they got their science right but at the end of the day it is bad science because their poor knowledge of history rendered their results useless’. Interestingly he was keen to distinguish the science that Bamshad et al. had ‘got right’ from the science that they had ‘got wrong’. This feeling was shared by most of the interviewees. In discussing the study they were creating a dichotomy between what could be described as science with the small ‘s’ and science with the capital ‘S’. Science with the small ‘s’ that in the view of my respondents the geneticists ‘got right’ is laboratory science, statistics, benchwork. At the same time science with the capital ‘S’ that they ‘got wrong’ is this grander investigatory process which was supposed to cast light on the origin of caste. It is in this process that, according to the interviewees, the geneticists were a failure, as their research methodology did not allow them to answer the set research question in a meaningful way.

By pointing to lapses in the geneticists’ knowledge of relevant theories and findings from history and other social sciences and humanities disciplines they were reinstating themselves as experts in the field in question. They were very well aware of explanatory powers assigned to scientists and rejected the claim that natural sciences may provide a more optimal way of reconstructing history.

Finally I would suggest that in this discussion the interviewees have revealed multiple identities, i.e. their identity of academics and of responsible citizens. As scholars, they argue that the geneticists’ contribution to the study of the caste system is negligible, because their science with a small ‘s’ is based on ‘bad’ history. Just like scientists dismiss public concerns about potential risks associated with genetics and biotechnology as ‘irrational prejudices’ based on ‘lay’ perceptions of scientific research, in the case considered here scholars argued that Bamshad et al had based their research on some ‘lay’ or ‘uneducated’ assumptions about the caste system which were far from the ‘expert’ knowledge about caste provided by social scientists and historians. As citizens they cast doubt on the validity of this research because of its social implications. This reminds us again that population genetic research on caste is an example of cases when, to use Alan Irwin and Brian Wynne’s (1996, 13) phrase, “science” as a category blurs into other areas of social practice and contestation’.

Conclusion

This paper has considered three questions about the context and implications of genetic studies of the caste system. What is the relationship between these studies and earlier

historical conceptualizations of the caste system? What are their possible socio-political implications? How have they been received by historians of caste, who were supposed to be the primary beneficiaries of this research? The genetic studies conducted on the subcontinent so far have not developed a consensus of opinion on the genetic history of the caste system. This has allowed different socio-political groups to use those studies which seemed to support their agendas as a rhetorical tool. On the basis of the data considered here it may be suggested that the question about whether we are witnessing the geneticization of the caste system cannot be answered definitively.

On the one hand, it may be argued that these studies are re-opening the tradition of naturalising and racialising caste. No matter what conclusions about the nature of the caste system they arrive at, the very idea of exploring the genetic component of caste differentiation appears to be underpinned by the kind of racist thinking in biology that has been critiqued by social scientists. On the other hand, when compared with historical constructions of caste, this DNA research appears to be a replay of earlier and current historical and political debates about the theory of Aryan migration and the relationship between caste and ethnicity.

Secondly, this paper has attempted to highlight the possible political implications of this research. As we have seen, genetic research on caste appears to have offered rhetorical ammunition for different political groups to support the claims that they have made before. This could be viewed as an endorsement of practices underpinned by 'race thinking' (Skinner 2007), which yet again signals the importance that biological knowledge is accorded nowadays in identity arbitration. At the same time, one could perhaps agree with the critics who have suggested that those who undergo genetic ancestry testing either on individual or community levels often tend to interpret the results within their personal and/or group narratives of origin and frameworks of relatedness (Nelson 2008, Parfitt and Egorova 2006, Prainsack and Hashiloni-Dolev forthcoming). In this sense, one could draw a parallel between the responses of the Dalits and the Hindu right to genetic studies on caste and the engagement with genetic ancestry tests demonstrated by African Americans and black British citizens. As Alondra Nelson has shown, the latter were interpreting genetic test results in the context of their own 'genealogical aspirations'. This led Nelson (2008, 761) to conclude that 'while the geneticization of race and ethnicity may be the basic logic of genetic genealogy testing, it is not necessarily its inexorable outcome'. Similarly, the Bene-Israel of India interpreted the results of the tests within the context of their struggle for recognition, when they argued that the presence of the Cohen Modal Haplotype in their community indicated

that they were the purest of all Jews (Parfitt and Egorova 2006, 114). As shown above, though on the one hand the Dalits have argued that now their claims are validated by science and they are clearly attributing to it superior cognitive authority, on the other hand, they have simply ‘picked and chosen’ the study that justified their claim, ignoring other research which argued the opposite.

To turn to the third question of the paper, geneticists argue that they are able to help historians by providing them with ‘hard’ evidence. Here yet again genetics appears to be claiming new territories. However, this geneticization of history is almost completely resisted by historians and social scientists doing research on caste who insist on the primacy of socio-historical analysis in their field. Moreover, despite the fact that they were not trained in genetics, they managed to make meaningful comments on this research due to their expertise in the history and social studies of India. Here again we see agendas of geneticization competing with forces of resistance.

To continue the discussion about the context of knowledge production in population genetic research in South Asia it would be important to explore the immediate and wider social and political environments in which scientists involved in this research in India and abroad are immersed.¹⁰ Analysis of these issues, which could be explored in future studies through ethnographies of laboratory practice, would illuminate the pressures and constraints determining scientists’ research agenda, as well as the agendas of those who sponsor their research. In the meantime it is tempting to suggest that what at least partly accounts for the growth of interest in the genetic history of the caste system is the fact that the debate about its origin is still alive in the wider socio-political domain.

ACKNOWLEDGEMENTS

This paper is based on a project sponsored by the British Academy (grant ref. SG: 41704) and I gratefully acknowledge their support. Interviews in India were conducted by Brian Black to whom I am extremely grateful. Parts of this paper have been presented at the seminar of the Public Culture in Theory and Practice Research Group at Durham University and at the session on Race and History organised by Soraya de Chadarevian at the Sixth Joint Meeting of the BSHS, CSHPS, and HSS and I am very thankful to the participants of both sessions for their feedback. I also owe a debt of gratitude to Roberta Bivins and Barbara Prainsack for their very valuable and insightful comments. Finally, I wish to thank Les Levidow, Kean Birch and the two anonymous referees for their useful suggestions.

References

- Abu El-Haj, N. (2007) The genetic reinscription of race, *Annual Review of Anthropology*, 36, pp.283-300.
- Bamshad, M. et al. (2001) Genetic Evidence on the Origins of Indian Caste Populations, *Genome Research*, 11 pp.994-1104.
- Basu, A. et al. (2003) Ethnic India: A Genomic View, with Special Reference to Peopling and Structure, *Genome Research*, 3, pp. 2277-2290.
- Bayly, S. (1995) Caste and 'Race' in the colonial ethnography of India, in: P. Robb (Ed.) *The Concept of Race in South Asia* (Delhi: Oxford University Press).
- Bivins, R. (2008) Hybrid Vigour? Genes, genomics, and history, *Genomics, Society and Policy*, 4, pp.12-22.
- Brodwin, P. (2002) Genetics, Identity, and the Anthropology of Essentialism, *Anthropological Quarterly*, 75, pp.323-30.
- Cavalli-Sforza, L.L. (2000) *Genes, Peoples, and Languages*, (Allen Lane: Penguin Press).
- Condit C. (1999) *The Meanings of the gene. Public debates about human heredity*, (Madison: University of Wisconsin Press).
- Cordeax, R. et al. (2004) Independent origins of Indian caste and tribal paternal lineages, *Current Biology*, 14, pp. 231-5.
- Davis, D. (2004) Genetic Research and Communal Narratives, *Hastings Center Report*, 34, pp. 40-49.
- Deloria, V. Jr. (1995) *Red Earth, White Lies: Native Americans and the Myth of Scientific Fact* (New York: Scribner).
- Dijk H, van. (1998) *Imagination. Popular images of genetics* (London: Macmillan).
- Dirks, N. (1997) Recasting Tamil society: the politics of caste and race in contemporary Southern India, in: C.J. Fuller (Ed.) *Caste Today: SOAS Studies on South Asia. Understandings and perspectives*, pp. 263-296 (Oxford: Oxford University Press).
- Dirks, N. (2001) *Castes of Mind: Colonialism and the Making of Modern India* (Princeton: Princeton University Press).
- Dula et al. (2003). The Ethical and Social Implications of Exploring African American Genealogies, *Developing World Bioethics*, 3, pp.133-141.
- Duster, T. (2005) Race and reification in science, *Science*, 307, pp.1050-1051.
- Egorova, Y. (2007) Genetics and tradition as competing sources of knowledge of human history, *Encyclopedia of Life Sciences* (available on <http://www.els.net>).

- Elliott, C. (2003) Adventures in the gene pool, *Wilson Quarterly*, 27, pp.12-22.
- Fausto-Sterling, A. (2004) Refashioning race: DNA and the politics of health care, *Differences*, 15, pp.1-37.
- Franklin, S. (1993) Essentialism, Which essentialism? Some implications of reproductive and genetic techno-science, in: J. P. de Cecco and J.P. Elia (Eds.) *If you seduce a gay person, can you make them gay? Issues in biological essentialism versus social constructionism in gay and lesbian identities* (New York: The Haworth Press).
- Fullwiley, D. (2007a) The molecularization of race: institutionalizing human difference in pharmacogenetic practice, *Science as Culture*, pp.1-30.
- Fullwiley, D. (2007b) Race and genetics; attempts to define the relationship, *Biosocieties*, 2, pp.221-237.
- HapMap. (2007 [cited 27 June 2007]) Available from <http://www.hapmap.org/whatishapmap.html>.
- Haraway, D. (1997) *Modest_Witness@Second_Millennium. FemaleMan_Meets_Oncomouse. Feminism and Technoscience* (New York: Routledge).
- Handwerk, B. (2006) India acquired language, not genes, from west, study says, http://news.nationalgeographic.com/news/2006/01/0110_060110_india_genes.html, 10 January 2006 [accessed 29 July 2008].
- Hartigan, J. (2008) Is race still socially constructed? The recent controversy over race and medical genetics, *Science as Culture*, 17, pp.163-193.
- Have, HAMJ ten. (2001) Genetics and culture: The geneticization thesis, *Medicine, Health Care and Philosophy*; 4, p. 295-304.
- Hedgecoe A. (1998) Geneticization, medicalisation and polemics, *Medicine, Health Care and Philosophy*, 1, pp. 235-43.
- Irwin, A. and B. Wynne (1996) Introduction, in: A. Irwin and B. Wynne (Eds.) *Misunderstanding science? The public reconstruction of public and technology*, pp.1-18 (Cambridge: Cambridge University Press).
- Jaffrelot, C. (1996) *The Hindu Nationalist Movement and Hindu Politics, 1925 to the 1990s* (London: Hurst).
- Johnston, J. (2003) Resisting a Genetic identity: The Black Seminoles and Genetic Tests of Ancestry, *Journal of Law, Medicine and Ethics*, 31, pp.262-71.
- Kahn, J. (2004) How a drug became “ethnic”: law, commerce and the production of racial categories in medicine, *Yale Journal of Health, Policy, Law and Ethics*, 4, pp. 1-46.
- Kahn, P. 1994. Genetic Diversity Project tries again, *Science* (266), pp. 720-3.

- Kivisild, T. et al. (2003) The genetic heritage of India's early settlers persists both in Indian tribal and caste populations, *American Journal of Human Genetics*, 72, pp.313-32.
- Leroi, A. (2005) A family tree in every gene, *New York Times*, 14 March.
- Lippman A (1991) Prenatal genetic testing and screening: constructing needs and reinforcing inequalities. *American Journal of Law and Medicine* 17(1/2): 15–50.
- Lock, M. (2005) 'The eclipse of the gene and the return of divination', *Current Anthropology*, 46, pp.547-70.
- M'charek, A. 2005. *The Human Genome Diversity Project. An Ethnography of Scientific Practice* (Cambridge: Cambridge University Press).
- Mahasabha, A.B.J., *Dalit Voice*, 16-31 March 2005, 24 (6) Available on www.dalitvoice.org (accessed 1 June 2008).
- Marks, J. (2002) *What it means to be 98% chimpanzee? Apes, people and their genes* (Berkeley: University of California Press).
- Nelkin, D. (2002) A Brief History of the Political Work of Genetics, *Jurimetrics*, 42, pp.121-33.
- Nelkin, D., Lindee, S. (1995) *DNA Mystique. The Gene as a Cultural Icon* (New York: Freedman).
- Nelson, A. (2008) Bioscience: genetic genealogy testing and the pursuit of African ancestry, *Social Studies of Science*, 38, pp.759-783
- Palmie, S. (2007) Genomics, divination, "racecraft", *American Ethnologist*, 34 pp. 205-222.
- Parfitt, T. (2002) Genes, Religion, and History: The Creation of a Discourse on Origin among a Judaizing African Tribe, *Jurimetrics*, 42, pp.209-219.
- Parfitt, T. and Y. Egorova (2006) *Genetics, Mass Media and Identity: A Case Study of the Genetic Research on the Lemba and Bene-Israel* (London: Routledge).
- Prainsack, B. and Y. Hashiloni-Dolev (2009) Religion and nationhood: collective identities and the new genetics, in: P. Glasner and M. Lock (Eds.) *Handbook of Genetics and Society* (London: Routledge).
- Prashad, V. (2000) Afro-Dalits of the Earth, Unite! *African Studies Review*, 43, pp.189-201.
- Pravidhik Jagat (2004). Genetic study confirm origin of Hindu caste system. [cited 6 October 2004]. Available from <http://www.pravidhik.com/news/nw/n0001.htm>.
- Rajagopal, R. (2006) The great Aryan non-debate, <http://raju-rajagopal.sulekha.com/blog/post/2006/10/the-great-aryan-non-debate.htm>, 14 October 2006, [accessed 28 July 2008].
- Reardon, J. (2005) *Race to the Finish: Identity and Governance in an Age of Genomics* (Princeton and Oxford: Princeton University Press).

- Reddy, D. (2005) The Ethnicity of Caste, *Anthropological Quarterly*, 78, pp.543-584.
- Rose, N. (2007) *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-First Century* (Princeton and Oxford: Princeton University Press).
- Roy, K. et al. (2005) *The Vedas, Hinduism, Hindutva* (Kolkata: Ebong Alap).
- Sabeti, P. (2002) DNA: an alternative record of African history. [cited 19 June 2002]. Available from http://www.africana.com/Articles/tt_524.htm.
- Sabir, S. (2003) Chimeral Categories: Caste, Race and Genetics, *Developing World Bioethics* 3 (2): 170-7.
- Sahoo, S. et al. (2005) A prehistory of Indian Y chromosomes: evaluating demic diffusion scenarios, *PNAS*, 103, pp.843-848.
- Sengupta, S. et al. (2006) Polarity and temporality of high-resolution y-chromosome distributions in India identify both indigenous and exogenous expansions and reveal minor genetic influence of Central Asian pastoralist, *American Journal of Human Genetics*, 78, pp.202-221.
- Sharma, R.S. (1999) *Advent of the Aryans in India* (New Delhi: Manohar).
- Simpson, B. (2000) Imagined genetic communities: ethnicity and essentialism in the twenty-first century, *Anthropology Today*, 16, pp.3-6.
- Skinner, D. (2006) Racialized futures: biologism and the changing politics of identity, *Social Studies of Science*, 36, pp.459-488.
- Skorecki, K. et al. (1997) Y Chromosomes of Jewish Priests, *Nature*, 385, p.32.
- Sleeboom-Faulkner, M. (2006) How to define a population: cultural politics and population genetics in the People's Republic of China and the Republic of China, *BioSocieties*, 1, pp.399-419.
- Smart, A., Tutton, R., Martin, P., Ellison, G.T.H., Ashcroft (2008) The standardization of race and ethnicity in biomedical science editorials and UK biobanks, *Social Studies of Science*, 38, pp.407-423.
- Snow, C.P. (1979) *The Two Cultures and a Second Look* (Cambridge: C.U.P).
- Spurdle, A., Jenkins T. (1996) The origins in of the Lemba "Black Jews" of Southern Africa; evidence from p12F2 and other Y-Chromosome markers, *American Journal of Human Genetics* 59 (5):1126-33.
- Thapar, R. (2002) *The Penguin History of Early India: from the origins to AD 1300*. London: Penguin.
- Thomas, M. et al. (1998) Origins of Old Testament priests. *Nature* 394 (6689):138–140.

Thomas, M. et al. (2000) Y chromosomes travelling south: the Cohen Modal Haplotype and the Origins of the Lemba – the ‘Black Jews’ of Southern Africa, *American Journal of Human Genetics*, 66, pp.674-86.

Trautmann, T. (1997) *Aryans in British India* (Berkeley: University of California Press).

Wailoo, K., Pemberton, S. (2006) *The Troubled Dream of Genetic Medicine: ethnicity and innovation in Tay-Sachs, cystic fibrosis, and sickle cell disease* (Baltimore, The Johns Hopkins University Press).

Widdows, H. (2007) Conceptualising the Self in the Genetic Era, *Health Care Analysis* 15, pp.5-12.

Zelliot, E. (1996) *From Untouchable to Dalit: Essays on the Ambedkar Movement*. New Delhi: Manohar.

¹ For further critical discussion of different aspects of ‘geneticization thesis’ see, for instance, Van Dijck 1998. For a discussion of the ‘genticization thesis’ see Hedgecoe 1998, Ten Have 2001, Condit 1999 .

² Following David Skinner I find it useful to distinguish between racism and ‘racialist’ (or race) thinking (Skinner 2006: 483).

³ For a very useful analysis see Hartigan 2008. For a discussion of internal debates among scientists about the usefulness of the term ‘race’ see Fausto-Sterling 2004.

⁴ For a detailed discussion see Parfitt 2002, papers by Azoulay, Johnston, Parfitt and Zoloth in *Developing World Bioethics*, 2003, 3 (2), and Parfitt and Egorova 2006.

⁵ For further discussion see Brodwin 2002, Elliott 2003, Johnston 2003.

⁶ For a discussion of genetics and African history see also Bivins 2008.

⁷ Interviews in India were conducted by Brian Black. Out of commitment to protecting respondents’ anonymity their identity will not be revealed.

⁸ P. Majumdar is one of the scientists involved in Sengupta (2006). See also Basu et al. (2003) and Brahmachari et al (2008).

⁹ The Babri Masjid (the mosque of Babur, Urdu) was constructed in Ayodhya in the sixteenth century at the site which many Hindus believe was the birthplace of Rama, one of the incarnations of the god Vishnu. The mosque was destroyed in 6 December 1992 by the crowd brought in by the Hindu communalist party Vishva Hindu Parishad (World Hindu Council) and associated groups. The destruction of Babri Masjid sparked one of the worst outbreaks of sectarian violence in contemporary Indian history.

¹⁰ For an excellent discussion of how population genetic research is influenced by social and political factors in the context of China, see Margaret Slegbom-Faulkner (2006).